Procedure for Using the Collimators May 2, 2003

Ray Fliller, Angelika Drees

The collimators should be used during stores to reduce backgrounds at all of the experiments. It is critical for the PHENIX muon identification system to reduce the background with the collimators. The collimators are to be used once everything is stable and steering for collisions is finished. Notify all the experiments before collimating and watch their backgrounds. All experiments can remain on. The instructions are unchanged from the d-Au run, but the setting are different, and subject to change as the machine heads toward real physics running. Call Ray or Angelika(p4123) if there are any questions or problems.

1. Start the application and Comfort Displays. On a 4 headed LINUX terminal, start the collimator application from Startup. The blue Collimator comes up as the default, but the program toggles between yellow and blue. In the diagnostics menu choose the "Start Comfort Display" option. This will bring up 11 Gpms on the screens.

   - Upper left
     - blue PIN Diodes
     - yellow PIN Diodes
     - BeamIons GPM
     - Scaled Experiment Backgrounds
   - Upper Right
     - PHOBOS chipmunks
     - PHOBOS backgrounds
     - STAR backgrounds
     - BRAHMS backgrounds
   - Lower Right
     - PHENIX backgrounds
     - PHENIX north tunnel scintillators
     - PHENIX south tunnel scintillators

2. Move to initial positions. Set the skew to the initial positions in one go. After the collimators stop moving, move the horizontal and vertical to the starting positions.

Starting collimator positions

Ring	Skew	Horizontal	Vertical
blue	50000	25000	55000
yellow	50000	25000	55000

   These can also be moved in one step. If per chance the PIN diode rates start to climb, hit the panic button for the plane moving and the collimator will stop. **The skew is not to be moved after this** (even if retracting the collimator). Moving the skew from this set point can increase backgrounds when the collimator is touching the beam.

3. Move the collimators into the beam. Using step sizes of about 2000 steps, move the collimator into the beam in one plane. When the PIN diodes start to increase, you are touching the beam. If the PIN diodes approach or exceed 100kHz (either spikes or steady state), use step sizes of 1000 steps. **As long as experimental backgrounds are dropping and the beam lifetime is unaffected, it is safe to move the collimators**. Typical collimator positions are

Typical collimator positions

Ring	Skew (set point)	Horizontal	Vertical
blue	50000	49000	86000
yellow	50000	51000	82000

   These are typical positions, you may have to move beyond them if necessary, or not as far.

The experiments are typically affected by collimation in the following ways:

- STAR blue halo is reduced most by blue horizontal.
- BRAHMS is reduced by the yellow horizontal.
- PHENIX MuID scintillators are reduced with both vertical collimators.
- PHOBOS seems to see a slight increase in the Paddle backgrounds with the blue collimator.

Sometimes it is necessary to move the collimators in quite a way before any drop in experimental backgrounds is seen. This drop can be quite dramatic for the PHENIX MuID scintillators. This is O.K. It is especially important to try to reduce the STAR blue halo and PHENIX MuId scintillators.

Stop moving or retract the collimators slightly if

- The lifetime degrades undo the last insertion.
- Any background sees a significant increase undo the last insertion.
- If spikes appear in an experimental background when the collimator is moved stop moving in that plane.
- Retract the collimators if any steering is done near PHENIX (call all experiments first).

When one plane is done, move to the other. Then move on to the other ring.

4. PIN diode rate in the blue ring will approach 100kHz. In the yellow ring, they can go as high as 600kHz. These values are not "the goal" of collimation. **The goal is to reduce the experiment backgrounds as much as possible, without affecting the beam lifetime**. It is acceptable if the PIN diode rates are different (higher or lower) than these typical values. The PIN Diodes and losses between Q3 and Q4 in 7 and 8 o'clock will not pull the permit.

5. Collimation will not work when:

   (a) Backgrounds are high due to bad lifetime in either ring (generally, but not necessarily).

   (b) Backgrounds are increasing for any reason (i.e. Drifting corrector, tune, etc.).

6. Special Note for Gap Cleaning: If the collimators are inserted beyond the default horizontal or vertical position for Gap Cleaning, there is no need to go to the default position in that plane. **Do not adjust the skew to the Gap Cleaning default**, this may inadvertently pull the permit if the collimator is horizontally inserted into the beam.

7. Special Note about Collimator Position display: On the application, the **right hand graph** which displays the collimator position in units of the beam sigma, **is completely untruthworthy**. This is not the fault of the application, it is the fault of the IPM calculation of the emittance. Pay not attention to it. The left hand graph, is fine.